

Unit 7

DAY 4

DISTANCE AND WORK PROBLEMS

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	(mL) Volume	% <sub>ALC</sub> alcohol	Volume ALC (mL)
Start	60	.20	12
add	X	.05	.05X
finish	60 + X	.10	$\frac{12 + .05X}{.10(60 + X)}$

let  $X$  = volume of 5% solution add (ml)

$$12 + .05X = .10(60 + X)$$

$$1200 + 5X = 10(60 + X)$$

$$X = 120$$

The Pharm. must add 120 mL of 5% Sol to the 20% sol.

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	Volume (L)	% <del>62</del> octane	Volume octane
92oct	X	.92	.92X
98oct	12-X	.98	.98(12-X)
96oct	12	.96	$12 \cdot .96 = 11.52$ $.92X + .98(12-X)$

let  $X$  = volume of 92% oct added (L)  
 let  $12-X$  = " " 98% " " (L)

$$.92X + .98(12-X) = 11.52$$

$X=4$   
 4 L of 92%, 8 L 98%

34) let  $x = \text{amt } (\$) \text{ dep. @ } 4.5\%$   
 $2x = \text{ " " " " @ } 5\%$

$$\begin{aligned} \text{int. @ } 4.5\% + \text{int. @ } 5\% &= \text{Total int} \\ .045x + .05 \cdot 2x &= 2900 \\ x &= 20,000 \end{aligned}$$

\$ 20,000 @ 4.5%  
40,000 @ 5%

# DISTANCE PROBLEMS

UNIT 7 DAY 4

## Ex1:

George jogged downhill at 6 mph and then jogged back up at 4mph. If the total jogging time was  $1\frac{1}{4}$  hr, how far did he jog in all?

$$rt = d$$

	rate (mph)	time (hours)	Distance (miles)
down	6	$\frac{x}{6}$	x
up	4	$\frac{x}{4}$	x

$$d = rt$$

$$t = \frac{d}{r}$$

let  $x = \text{one-way dist (m)} = 3$

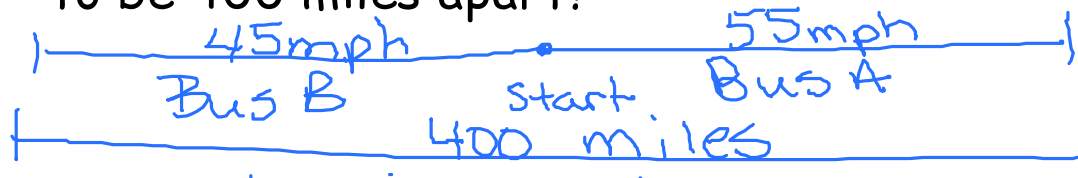
time down + time up = total time

$$\frac{x}{6} + \frac{x}{4} = \frac{5}{4}$$

$$x = 3$$

6 miles total

**Ex2:** Two buses leave Houston at the same time and travel in opposite directions. One bus averages 55 mph and the other bus averages 45 mph. How long will it take them to be 400 miles apart?



	rate (mph)	time hours	Dist. (m)
A	55	$t$	$55t$
B	45	$t$	$45t$

let  $t$  = time it takes for A + B to be 400 miles apart

$$\begin{array}{l} \text{Bus A's} \\ \text{dist} \end{array} + \begin{array}{l} \text{Bus B's} \\ \text{dist} \end{array} = \begin{array}{l} \text{Total} \\ \text{Dist} \end{array}$$

$$55t + 45t = 400 \quad \begin{array}{l} \text{It takes} \\ \text{4 hours} \dots \end{array}$$

$$\begin{array}{l} 100t = 400 \\ t = 4 \end{array}$$

$$\begin{array}{r} 220 \\ 180 \\ \hline 400 \end{array}$$

## Work problems

**Ex3:** Diana can mow the lawn in 20 minutes. Joan can mow the lawn in 30 minutes. If they work together, how long will it take them to mow the lawn?

	rate (part/min)	time (min)	part completed
Diana	$\frac{1}{20}$	$t$	$\frac{t}{20}$
Joan	$\frac{1}{30}$	$t$	$\frac{t}{30}$

let  $t$  = time needed to mow tog. (min)

Diana's part + Joan's part = whole Job

$$\frac{t}{20} + \frac{t}{30} = 1$$

$$t = 12$$

**Ex4:** An experienced carpenter can panel a room 3 times faster than an apprentice can. Working together, they can panel the room in 6 hours. How long would it take each one working alone to do the job?

let  $x$  = amt time it takes the exp. painter to finish(h)

let  $3x$  = time it takes apprent (h)

	Rate part/hr	time (hrs)	Part completed
exp	$\frac{1}{x}$	6	$\frac{6}{x}$
app	$\frac{1}{3x}$	6	$\frac{2}{x}$

$$\begin{aligned} \text{exp part} + \text{app part} &= \text{whole} \\ \frac{6}{x} + \frac{2}{x} &= 1 \\ x &= 8 \end{aligned}$$

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